

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:)
DENNIS)
Serial No. Not Yet Assigned)
Filing Date: Herewith)
For: REFERENCE DATA CODING IN)
SOLID STATE IMAGE SENSORS)

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DATE OF DEPOSIT: February 7, 2002

NAME: Dawn Kimler

SIGNATURE: Dawn Kimler

PRELIMINARY AMENDMENT

Director, U.S. Patent and Trademark Office
Washington, D.C. 20231

Sir:

Prior to the calculation of fees and examination of
the present application, please enter the amendments and
remarks set out below.

In the Drawings:

Submitted herewith is a request for a proposed
drawing modification as indicated in red ink to label FIG. 1
as prior art and to label the blocks therein. FIG. 2 is also
being modified as indicated in red ink to add a missing
reference numeral and to correct the spelling of a word.

In the Specification:

Please replace the paragraph beginning at page 2,
line 16, with the following rewritten paragraph:

-- In view of the foregoing background, an object of
the present invention is to store reference data in a solid
state image sensor.

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This and other objects, advantages and features in accordance with the present invention are provided by a method of encoding data in a solid state image sensor comprising an array of pixels. The method preferably comprises applying color processing to the array of pixels, with the array of pixels comprising a plurality of border pixels. The method preferably further comprises varying the color processing applied to the plurality of border pixels for encoding data therein.

In one approach for the color processing, the color processing is applied by applying a color filter mosaic to the array of pixels. The color processing is varied by varying a pattern of the color filter mosaic applied to the plurality of border pixels. The color filter mosaic may comprise color filter material, and variation of the pattern of the color filter mosaic comprises removing the color filter material from selected border pixels. The color filter mosaic may also comprise a plurality of color filter layers, and variation of the pattern of the color filter mosaic comprises applying the plurality of color filter layers to selected border pixels.

The color filter mosaic may comprise a Bayer pattern color filter mosaic that is based upon a plurality of color filter elements. Variation of the pattern of the color filter mosaic comprises encoding one bit of binary data in two adjacent blocks of four pixels of the Bayer pattern color filter mosaic by varying the color filter elements applied to one pixel of one of the two adjacent blocks.

In another approach for the color processing, the color processing is applied by applying a microlens array to

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the array of pixels. Variation of the color processing comprises varying a pattern of the microlens array applied to the plurality of border pixels.

The method according to the present invention advantageously allows reference data to be encoded in the border pixels instead of within the chip circuitry. It is not practical to record such data in the chip circuitry during manufacture of an image sensor since the details of the subsequent color processing may not be known at the time of manufacture. The encoded data may include a color process code, a mask revision code, a product code, and at least one of a start code and an end code.

Another aspect of the invention is directed to a method of reading data encoded in a solid state image sensor comprising an array of pixels. The data has been encoded in the solid state image sensor by applying color processing to the array of pixels, with the array of pixels comprising a plurality of border pixels, and by varying the color processing applied to the plurality of border pixels for encoding the data therein. The method comprises illuminating the array of pixels, and processing signals output from the plurality of border pixels, with the signals corresponding to the encoded data.

Yet another aspect of the present invention is directed to a solid state image sensor system comprising an array of pixels comprising a plurality of border pixels, with the plurality of border pixels having data encoded therein by color processing. --

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In the Claims:

Please cancel Claims 1 to 16.

Please add new Claims 17 to 45.

17. A method of encoding data in a solid state image sensor, the method comprising:

applying color processing to the array of pixels, with the array of pixels comprising a plurality of border pixels; and

varying the color processing applied to the plurality of border pixels for encoding data therein.

18. A method according to Claim 17, wherein applying the color processing comprises applying a color filter mosaic to the array of pixels; and wherein varying the color processing comprises varying a pattern of the color filter mosaic applied to the plurality of border pixels.

19. A method according to Claim 18, wherein the color filter mosaic comprises color filter material; and wherein varying the pattern of the color filter mosaic comprises removing the color filter material from selected border pixels.

20. A method according to Claim 18, wherein the color filter mosaic comprises a plurality of color filter layers; and wherein varying the pattern of the color filter mosaic comprises applying the plurality of color filter layers

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to selected border pixels.

21. A method according to Claim 18, wherein the color filter mosaic comprises a Bayer pattern color filter mosaic based upon a plurality of color filter elements; and wherein varying the pattern of the color filter mosaic comprises encoding one bit of binary data in two adjacent blocks of four pixels of the Bayer pattern color filter mosaic by varying the color filter elements applied to one pixel of one of the two adjacent blocks.

22. A method according to Claim 17, wherein applying the color processing comprises applying a microlens array to the array of pixels; and wherein varying the color processing comprises varying a pattern of the microlens array applied to the plurality of border pixels.

23. A method according to Claim 17, wherein the encoded data includes a color process code.

24. A method according to Claim 17, wherein the encoded data includes a mask revision code.

25. A method according to Claim 17, wherein the encoded data includes a product code.

26. A method according to Claim 17, wherein the encoded data includes at least one of a start code and an end code.

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27. A method of encoding data in a solid state image sensor, the method comprising:

applying color processing to the array of pixels using a color filter mosaic, with the array of pixels comprising a plurality of border pixels; and

varying a pattern of the color filter mosaic for varying the color processing applied to the plurality of border pixels for encoding data therein.

28. A method according to Claim 27, wherein the color filter mosaic comprises color filter material; and wherein varying the pattern of the color filter mosaic comprises removing the color filter material from selected border pixels.

29. A method according to Claim 27, wherein the color filter mosaic comprises a plurality of color filter layers; and wherein varying the pattern of the color filter mosaic comprises applying the plurality of color filter layers to selected border pixels.

30. A method according to Claim 27, wherein the color filter mosaic comprises a Bayer pattern color filter mosaic based upon a plurality of color filter elements; and wherein varying the pattern of the color filter mosaic comprises encoding one bit of binary data in two adjacent blocks of four pixels of the Bayer pattern color filter mosaic by varying the color filter elements applied to one pixel of one of the two adjacent blocks.

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31. A method according to Claim 27, wherein the encoded data includes at least one of a color process code, a mask revision code, a product code, a start code and an end code.

32. A method of encoding data in a solid state image sensor, the method comprising:

applying color processing to the array of pixels using a microlens array, with the array of pixels comprising a plurality of border pixels; and

varying a pattern of the microlens array for varying the color processing applied to the plurality of border pixels for encoding data therein.

33. A method according to Claim 32, wherein the encoded data includes at least one of a color process code, a mask revision code, a product code, a start code and an end code.

34. A method of reading data encoded in a solid state image sensor comprising an array of pixels, the data being encoded by applying color processing to the array of pixels with the array of pixels comprising a plurality of border pixels, and by varying the color processing applied to the plurality of border pixels for encoding the data therein, the method comprising:

illuminating the array of pixels; and

processing signals output from the plurality of border pixels, with the signals corresponding to the encoded

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data.

35. A method according to Claim 34, further comprising storing the data read from the solid state image sensor.

36. A method according to Claim 34, wherein the encoded data includes at least one of a color process code, a mask revision code, a product code, a start code and an end code.

37. A solid state image sensor system comprising:
an array of pixels comprising a plurality of border pixels;
said plurality of border pixels having data encoded therein by color processing.

38. A solid state image sensor system according to Claim 37, wherein said array of pixels comprises a color filter mosaic encoding the data.

39. A solid state image sensor system according to Claim 38, wherein said color filter mosaic comprises color filter material on selected border pixels.

40. A solid state image sensor system according to Claim 38, wherein said color filter mosaic comprises a plurality of color filter layers on selected border pixels.

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41. A solid state image sensor system according to Claim 38, wherein said color filter mosaic comprises a Bayer pattern color filter mosaic having a pattern comprising one encoded bit of binary data in two adjacent blocks of four pixels.

42. A solid state image sensor system according to Claim 37, wherein said array of pixels comprises a microlens array encoding the data.

43. A solid state image sensor system according to Claim 37, wherein the encoded data includes at least one of a color process code, a mask revision code, a product code, a start code and an end code.

44. A solid state image sensor system according to Claim 37, further comprising a processor for processing the encoded data read from said plurality of border pixels.

45. A solid state image sensor system according to Claim 37, further comprising a memory for storing the encoded data read from said plurality of border pixels.

REMARKS

It is believed that all of the claims are patentable over the prior art. For better readability and the Examiner's convenience, the newly submitted claims differ from the translated counterpart claims which are being canceled. The newly submitted claims do not represent changes or amendments

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that narrow the claim scope for any reason related to the statutory requirements for patentability. Accordingly, after the Examiner completes a thorough examination and finds the claims patentable, a Notice of Allowance is respectfully requested in due course. Should the Examiner determine any minor informalities that need to be addressed, he is encouraged to contact the undersigned attorney at the telephone number below.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached paper is captioned "Version With Markings to Show Changes Made."

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Paragraph beginning at page 2, line 16 has been amended as follows:

[The invention, in its various aspects, is defined in the Claims appended hereto.] In view of the foregoing background, an object of the present invention is to store reference data in a solid state image sensor.

This and other objects, advantages and features in accordance with the present invention are provided by a method of encoding data in a solid state image sensor comprising an array of pixels. The method preferably comprises applying color processing to the array of pixels, with the array of pixels comprising a plurality of border pixels. The method preferably further comprises varying the color processing applied to the plurality of border pixels for encoding data therein.

In one approach for the color processing, the color processing is applied by applying a color filter mosaic to the array of pixels. The color processing is varied by varying a pattern of the color filter mosaic applied to the plurality of border pixels. The color filter mosaic may comprise color filter material, and variation of the pattern of the color filter mosaic comprises removing the color filter material from selected border pixels. The color filter mosaic may also comprise a plurality of color filter layers, and variation of the pattern of the color filter mosaic comprises applying the

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plurality of color filter layers to selected border pixels.

The color filter mosaic may comprise a Bayer pattern color filter mosaic that is based upon a plurality of color filter elements. Variation of the pattern of the color filter mosaic comprises encoding one bit of binary data in two adjacent blocks of four pixels of the Bayer pattern color filter mosaic by varying the color filter elements applied to one pixel of one of the two adjacent blocks.

In another approach for the color processing, the color processing is applied by applying a microlens array to the array of pixels. Variation of the color processing comprises varying a pattern of the microlens array applied to the plurality of border pixels.

The method according to the present invention advantageously allows reference data to be encoded in the border pixels instead of within the chip circuitry. It is not practical to record such data in the chip circuitry during manufacture of an image sensor since the details of the subsequent color processing may not be known at the time of manufacture. The encoded data may include a color process code, a mask revision code, a product code, and at least one of a start code and an end code.

Another aspect of the invention is directed to a method of reading data encoded in a solid state image sensor comprising an array of pixels. The data has been encoded in the solid state image sensor by applying color processing to the array of pixels, with the array of pixels comprising a plurality of border pixels, and by varying the color processing applied to the plurality of border pixels for

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encoding the data therein. The method comprises illuminating the array of pixels, and processing signals output from the plurality of border pixels, with the signals corresponding to the encoded data.

Yet another aspect of the present invention is directed to a solid state image sensor system comprising an array of pixels comprising a plurality of border pixels, with the plurality of border pixels having data encoded therein by color processing.

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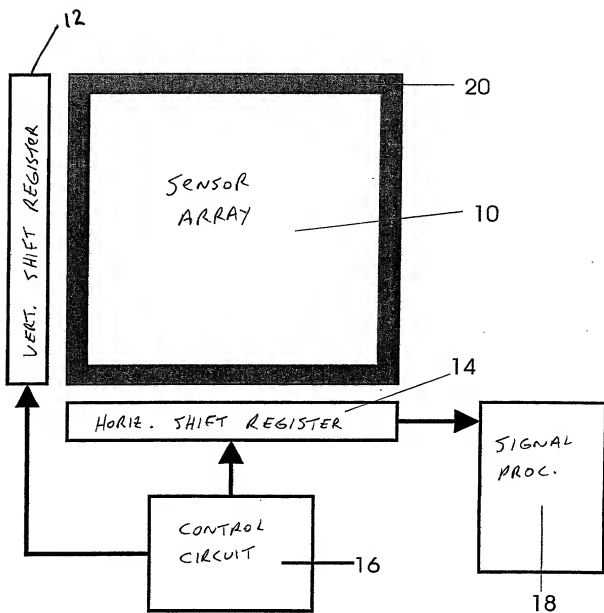
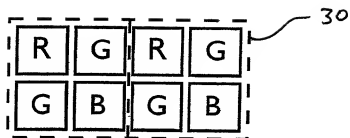


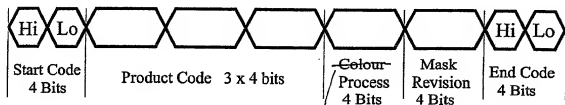
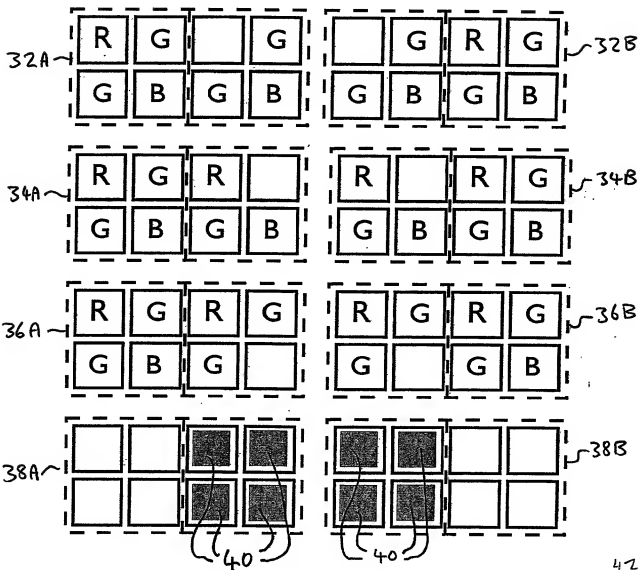
FIG. 1
(PRIOR ART)

FIG. 2



Logic 0

Logic 1



Color